shells, both individually and specifically, and the graduation of the various types (species) into one another (p. 22).

In dealing with this latter subject the author has possessed unusual facilities, since himself and his father have availed themselves of the 15,000 Brachiopods collected from Brickhill to arrange sets of connecting forms between recognised species of *Terebratula*, *Waldheimia*, and *Terebratella*. It must not be supposed that between all the species enumerated the connecting morphological varieties are equally evident or of equally frequent occurrence: between some species the passage is simple and clear, both as to the main line and the offshoots, whilst between others much more searching is required to establish the connecting series.

Brickhill indeed seems to have been a centre, as regards the Brachiopoda, of inordinate fecundity accompanied by considerable inosculation of form, just one of those places, in fact, where the oft-demanded missing link was manufactured on a large scale, whilst at Upware and other places on the same horizon the form-groups known as "species" had somewhat contracted their circle of variation. Doubtless almost every zoological group has had its Brickhills in the course of ages, though the chances of preservation and subsequent discovery must limit the number accessible to research. Mr. Keeping, having given us valuable and cogent proofs of the mutability of the forms of Brachiopoda, and apparently somewhat uneasy as to the results of his own conclusions, proceeds to assure us that the value of "species" has been considerably enhanced by these investigations both to the naturalist and the stratigraphist.

Glancing briefly at the part devoted to special palæontology, we learn that the vertebrate remains of Upware are in a great part truly Neocomian species native to the deposit. The probable identity of form of some of the palatal teeth of Jurassic and Neocomian species is insisted on especially in the case of *Sphærodus*.

Coming to the Invertebrata, we find that Cephalopoda are by no means individually numerous; they are for the most part well-known Aptian species. Neither are the Gasteropoda at all plentiful, though some new species are described, including two of *Nerinæa*, both very rare. This is the more remarkable as the uppermost Jurassic rocks of England are, as far as we know, devoid of this genus. The oysters form an important feature, and, excluding the plaited species, greatly resemble those of the Jurassic rocks. Mr. Keeping is convinced that the shell he refers to *Gryphæa dilatata*, Sow., is a genuine native. It is somewhat singular that the Oxfordian *G. dilatata* should have been resuscitated rather than the Portland-Kimmeridge *Ostrea expansa*, Sow., which swarms in the Upper Kimmeridge (Middle Portlandian) of Bucks and in the Portland stone of several localities. On the whole there is a fair list of Monomyaria, including some new species.

Of the Dimyaria one species of *Trigonia* occurs, and is restricted, it would seem, to Upware. The Arcadæ are well represented, three species of *Pectunculus* being given. Of the remaining genera *Cypricardia* and *Cyprina* have the most species, but none are quoted as abundant, though some new species are described. The Brachiopoda, Polyzoa, and Sponges, as every one knows, make up the bulk of the fossils, many of the latter being identical with those of Farringdon.

The table tells us that 151 species are listed from Upware and 88 from Brickhill. Of these 45 occur at Farringdon, 39 at Godalming, 24 at Speeton, 21 at Potton, 19 at Tealby, Shanklin, and Atherfield respectively, 16 in the Hythe beds, 6 in the Folkestone beds, 1 in the Hunstanton Red Chalk, and a doubtful case in the Folkestone Gault.

The book is conveniently got up, not being too large, is well illustrated by Foord, and altogether forms a most desirable volume for the Mesozoic geologist.

W. H. H.

OUR BOOK SHELF

Sound and Music. By Sedley Taylor. Second Edition. (London: Macmillan and Co., 1883.)

THAT this excellent elementary work has at last reached a second edition is certainly in one respect satisfactory. But that nine years should have been occupied in the process, while the "popular" rubbish of the paper scientists has in many cases (or at least is proclaimed as having) annual or biennial reproduction, is matter for profound regret and meditation.

We noticed so fully (NATURE, vol. x. p. 496) the first edition of Mr. Taylor's work, that it is not necessary to say much now. Some of the parts to which we formerly took exception have been considerably modified; in all cases but one, we think, for the better. The one exception is that about the use of the word *force* (or opposite systems of forces) in the explanation of the mutual destruction of sounds by interference.

The word "*timbre*" has been excised, and its place supplied by "quality"; but the hideous misuse of the English word "clang" in the sense of a harmonious combination of sounds still disfigures the later pages. It is time that a definite and suitable nomenclature should be once for all introduced into this part of the subject. There are many words, such as "sound," "note," "tone," &c., which every one seems to think himself entitled to employ as it pleases him, even to the extent of using one of them occasionally in two perfectly incompatible senses. But almost anything would be preferable to a literal transcription of Helmholtz's words into an English book, without regard to the inevitable incongruities.

Southern and Swiss Health Resorts. By William Marcet, M.D., F.R.S. 12mo, pp. 408. (London: Churchill, 1883.)

Nice and its Climate. By Dr. A. Barèty, translated, with additions, by Charles West, M.D. 12mo, pp. 162. (London: Edward Stanford, 1882.)

THIS work of Dr. Marcet is written in an easy, popular style, and gives people very much the sort of information they want. It begins with advice to invalids about to visit the Riviera regarding dress and food, next has something to say regarding hotels, boarding-houses, apartments, and villas; gives some general ideas of social life in the health resorts of the Mediterranean coast, and then proceeds to a more purely climatological description of the Riviera in general and of the particular characteristics of the different towns upon it. Dr. Marcet's residence for some years on the Riviera gives his description of the health resorts there all the accuracy and fulness, without unnecessary detail, which personal acquaintance alone can secure. The same may be said of his description of the health resorts of Switzerland, and his account of the Swiss resorts at low or moderate elevations are particularly interesting and useful. As a guide to invalids the

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book is rendered more complete by a short account of Italian health resorts, Algiers, Egypt, Madeira, and Teneriffe. The book will be useful both to invalids who are meditating a winter abroad and to medical men by aiding them in the selection of the proper places to which to send patients.

Dr. Barety's description of Nice and its climate is naturally very much fuller than Dr. Marcet's, and while the latter is a useful guide to the selection of a health resort, the former will be of great service to those who have already fixed upon Nice. The climate of this town varies very much in its different parts, and the proper selection of an hotel or residence is of considerable importance. As a guide in this, and also as a general handbook for reference when residing in the town, Dr. Barety's book is to be recommended.

Vichy and its Therapeutical Resources. By Prosser James, M.D., M.R.C.P., &c. Fifth Edition. Pp. 84. (London: Baillière, Tyndall, and Cox, 1883.)

THIS is a small guide-book to Vichy, pleasantly written. It contains, as usual in such books, a general account of the place, its springs bathing establishments and environs, analyses of the waters, and an enumeration of the diseases in which they are said to be useful. We doubt whether the latter part will be of very much service either to medical men or to invalids; it might, we think, have been omitted with advantage.

LETTERS TO THE EDITOR

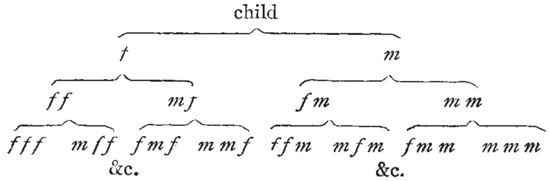
[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts, No notice is taken of anonymous communications.*

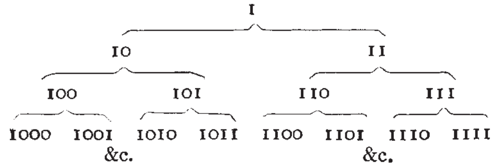
The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Arithmetic Notation of Kinship

MANY writers have endeavoured to devise a simple method of describing the various forms of kinship, which, when expressed verbally, are cumbrous and puzzling in the highest degree. I suspect, however, that if we had always been as familiar with the binary system of arithmetic as we are with the decimal, that the facilities afforded by a numerical system of notation of kinship would have been so obvious that it would have been adopted as a matter of course. The notation I am about to propose is numerical, but it is not binary. It however contains implicitly, as we shall see, owing to the laws that govern numbers, the most important advantages of the binary notation, and it seems better to begin to explain it from the latter point of view.

The number of direct ancestors that a person has in successive generations is . . . 2^4, 2^3, 2^2, 2^1, followed by 2^0 for himself, the corresponding binary notations being 10,000, 1000, 100, 10, 1 respectively. We also see on a little reflection that, this being the case, every direct ancestor in the nth degree admits of being specified by a particular number, consisting of $n + 1$ places of figures. Thus the two parents may be represented by 10 and 11, the four grandparents by 100, 101, 110, 111, and so on. Let us draw up two schemes of ancestral roots, identical in arrangement, but using in the one the symbols of f for "the father of," and m for "the mother of," and employing binary notation in the other:—





We see (a) that if we disregard the child, and speak only of his or her ancestry, all the even numbers apply to one sex and all the odd ones to the other; (b) that each term is derived from its ancestral terms in so simple a way that it carries on its face every step in the line of descent, however long it may be, through which each ancestor is related to the child. Therefore, as I began by saying, if we were familiar with decimal notation, we should long since have described each form of ancestry by it. Instead of saying that "B was a grandmother, namely, a father's mother of A," we should have said "B was 101 of A." Or again, instead of saying that "C was first cousin once removed to D, the father's father's parents of C being the mother's parents of D," we should have said "the 1000-1 of C are the 110-1 of D." The case might have been one of half-blood, say by the father's side, then "the 1000 of C would be the 110 of D," a notation which grows in simplicity as the verbal equivalent grows in complexity.

Being, however, unfamiliar with binary notation, we fall back on the decimal, and translate the above numbers into their equivalents, which are those I propose for the arithmetic notation of kinship, as entered in the table below.

Table of Ancestral Roots

Grade of kinship.	Father's side.	Mother's side.
Child	1	
Parents	2	3
Grandparents ...	4 5	6 7
Great-grandparents &c.	8 9 10 11 &c.	12 13 14 15 &c.

The sex of 1 is unspecified, it is equivalent to the word "child," but all other odd numbers refer to females, and all even numbers refer to males. If n is the register number of any ancestor, the register numbers of his parents are $2n$ and $2n + 1$. We can thus construct or analyse any register number with great facility. It is not worth while giving an example of construction, but I may give one of analysis. I write down the number and append to it a series of successive halvings, so far as the numbers are, or come out, even; otherwise I substract 1 before taking their halves. Then I write f (= father of), or m (= mother of), as the case may be, below each entry. Let 253 be the number, then I get—

253	126	63	31	15	7	3	child
m	*f*	*m*	*m*	*m*	*m*	*m*	child

For purposes of exhaustive inquiry into the antecedents of a family, this notation has the advantage of an index, and of showing very compendiously how much has been done, and how much remains to do.

FRANCIS GALTON

"Stachys palustris" as Food

THERE is no reason to think that *Stachys palustris*, L., is anywhere used now for food in the British Isles. The cultivation of the potato must have long since put it out of court for any such purpose. But that it was once so employed there seems abundant evidence. The part eaten, however, was not the "rhizomes," but the subterranean tubers. That the use of these is now quite forgotten may be inferred from the fact that the tubers themselves are not even mentioned in standard systematic books. Yet Irmisch (see *Botanical Gazette*, vol. ii. p. 293) gives the potato and *Stachys palustris* as well known instances of dicotyledonous plants producing stem tubers which become detached by the dying away of the older parts of the parent plant which produced them.

Johnson, in the second edition of Gerarde's "Herbal" (1636), has nothing to say about the edibleness of the tubers. But he

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